

## **SECTION 01 79 00**

### **DEMONSTRATION AND TRAINING**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Training District personnel.
- B. Training courses.
- C. Training Program.
- D. Training Program deliverables.
- E. Training aids, materials, and devices.

##### **1.02 MEASUREMENT AND PAYMENT:**

- A. Separate measurement or payment will not be made for work required under this Section. All costs in connection with the work specified herein will be considered to be included with the related item of work in the Bid schedule of the Bid Form, or incidental to the work.

##### **1.03 SYSTEM DESCRIPTION - OVERALL**

- A. The training of District personnel shall encompass training in the management, operation, and maintenance of equipment and systems furnished under the Contract. Personnel to be trained include maintenance, engineering, and operations personnel.
- B. The Training Program shall enable District personnel to operate, service, enhance, maintain, and interact with, the hardware, software, and firmware, such that the equipment and systems will perform in accordance with the Contract requirements.

##### **1.04 SYSTEM DESCRIPTION - TRAINING PROGRAM**

- A. The Training Program shall consist of a logically related sequence of separate courses as described in the Training Program Plan.
- B. The Program shall include separate courses, as required, for System and Equipment Operation, System Management, Primary Maintenance, and Secondary Maintenance.
- C. The Program shall include courses in addition to those listed if additional courses are required to achieve the Program Objectives.
- D. The Program shall utilize classroom, hands-on, and field instruction, as appropriate, and any fixtures, models, mockups, simulators, aids, documentation, and equipment required to implement, sustain, and complete the Program.
- E. Systems and Equipment will be broken down into Groups and listed in Contract Specifications, Section 01 79 00, Demonstration and Training, for the purposes of defining the extent of training requirements applicable to specific systems and equipment.

1. Group 1 Systems and Equipment: All requirements specified herein apply to Group 1 Systems and Equipment.
2. Group 2 Systems and Equipment: The requirements specified herein apply to Group 2 Systems and Equipment with the exception of the Staged Training (specified in Article 1.07D). The District will conduct Group 2 Systems and Equipment training courses, but all other work of this Section applies.
3. Group 3 Systems and Equipment: The District will conduct Group 3 Systems and Equipment training courses utilizing O&M Manuals submitted under Section 01 78 23, Operation and Maintenance Data, and the following additional deliverables and support. The Contractor shall provide any models, mockups, simulations, special tools, software, test equipment, including procedures for repair and maintenance needed to stage the Training Program, and which are not supplied elsewhere in this Contract. The Contractor shall provide access to its technical personnel as needed to consult with the District's training representatives to support development of training programs.
4. For other equipment, the District will train its personnel utilizing O&M Manuals submitted under Section 01 78 23, Operation and Maintenance Data, and other materials required under the Contract.

#### **1.05 SUBMITTALS**

- A. Submit the following to the Engineer for approval (Training Program Deliverables): Training Program Plan, Instructor Guides and Attachments, Student Training Manuals, and Final Deliverables. Training Program Deliverables also include:
  1. Training Demonstrations (presented for approval).
  2. Staged Training.
- B. Reference Documents: Submit to the Engineer all documents that are used as sources of the material in the Instructor Guide for the use of the District's Training Department.
- C. Final Deliverables: Final Deliverables shall consist of the final, approved versions of the following. Quantities of final deliverables, except as otherwise specified herein, will be defined for each system and equipment type in Contract Specifications Section 01 79 00, Demonstration and Training, except in no case shall the number of copies be less than 6. Quantity of Student Training Manuals for each course shall equal the number of students, as defined in the Contract Specifications, plus two additional copies.
  1. The approved version of the Instructor Guides, Attachments to the Instructor Guides, and Student Training Manuals delivered in both hard copy and electronic media. One set of electronic files shall be submitted on CD-ROM formatted in accordance with current District standards.
  2. Any models, mockups, simulations, special tools, software, test equipment, or other Training Materials which are needed to stage the Training Program, and which are not supplied elsewhere in this Contract.

3. Any self-paced, computer-based, or multimedia materials needed to stage the Training Program.
- D. Submit Training Reports.
- E. Training Program Milestone Schedule: Prepare a Training Program Milestone Schedule, in consultation with the District, for the approval of the Engineer. Coordinate Training Program Milestones with submittals required under Section 01 78 23, Operation and Maintenance Data. This work of this Section with the exception of the work specified in the Article entitled "Supplemental Training and Revisions" shall be completed prior to initiation of Acceptance Testing.
1. The Training Program Milestones consist of the following Submittals:
    - a. Operation and Maintenance Manual (Draft)
    - b. Training Program Plan
    - c. Operation and Maintenance Manual (Complete Draft)
    - d. Instructor Guides and Attachments
    - e. Training Demonstrations
    - f. Final Training Program Deliverables
    - g. Staged Training
    - h. Training Report
  2. Training Program Milestone Schedule shall show Training Program Milestones in calendar relation to Project Milestones. Sample Training Program Milestone Schedule is available upon request.
  3. Obtain Engineer's approval of each Training Program Milestone before proceeding to the next.

#### **1.06 INSTRUCTOR QUALIFICATIONS**

- A. Training Courses shall be presented in person by an Instructor with the following qualifications:
1. Fluency in English.
  2. Experience as classroom Instructor.
  3. Relevant technical and practical experience with the BART contracted System and Equipment installation.
  4. A thorough knowledge of the Instructor Guides, Training Manuals, references, and procedures, tools, test equipment, and other aids required to present the Training Course.

## **1.07 REGULATORY REQUIREMENTS**

- A. The Training Program shall incorporate, as applicable, the requirements of regulatory agencies such as the California Public Utilities Commission (CPUC), American Disabilities Act (ADA), Environmental Protection Agency (EPA), California Code of Regulations: Title 8, California Occupational Safety and Health Administration (CAL OSHA), and the California Department of Motor Vehicles.

## **1.08 TRAINING COURSES**

- A. Training Courses shall consist of classroom, hands-on, and field training as necessary to accomplish the Course Objectives specified in the Training Program Plan.
  - 1. Prerecorded presentations shall not substitute for an instructor.
- B. Each Course shall be BART-specific and applicable to the BART environment.
- C. When the O&M Manual is referenced herein, it shall be understood to mean the O&M Manual prepared for the specific System or Equipment, in accordance with Section 01 78 23, Operation and Maintenance Data.
- D. System and Equipment Operation Training Course shall:
  - 1. Enable BART personnel to operate the Facility, System and Equipment unassisted.
  - 2. Provide classroom, hands-on, and field training in actual operation of the Facility, System and Equipment.
  - 3. Provide written procedures, as required in the O&M Manual, for the following:
    - a. Operating the Facility, System and Equipment.
    - b. Testing the readiness of the System and Equipment for revenue service, without the need for disassembly or physical entry.
    - c. Operator-level fault diagnosis and corrective action.
- E. System Management Training Course shall:
  - 1. Enable BART personnel to operate, configure, and manage the System and Equipment.
  - 2. Provide classroom, hands-on, or field training in the use of the software and firmware development environments.
  - 3. Enable BART personnel to install software revisions and upgrades.
  - 4. Provide written procedures, as required in O&M Manual, for developing revisions to the software and firmware.

F. Primary Maintenance Training Course shall:

1. Provide detailed theory of operation, including power distribution, data paths, and signal conditions for all inputs and outputs of all electromechanical modules and submodules.
2. Provide written procedures, as required in the O&M Manual, for Facility, System and Equipment Operation, Preventive Maintenance, and Corrective Maintenance.
3. Enable BART personnel to operate the Facility, System and Equipment, including interfaces to other equipment.
4. Provide hands-on, step-by-step instruction in the disassembly and assembly of mechanical, electrical, electromechanical, and electronic Lowest Level Field Replaceable Units (LLFRU).
5. Train BART personnel to utilize Facility, System and Equipment documentation to perform Preventive and Corrective Maintenance.
6. Provide hands-on training in Preventive Maintenance, including procedures for cleaning, lubricating, and adjusting, and for evaluating the wear of modules and submodules.
7. Enable BART maintenance personnel to diagnose, isolate, and repair faults to the Lowest Level Field Replaceable Unit (LLFRU), using commercially available, or special test equipment supplied under the Contract.

G. Secondary Maintenance Training Course shall:

1. Provide detailed theory of operation, including power distribution, data paths, and signal conditions for all inputs and outputs of all modules, submodules, and circuit boards to component level.
2. Provide written procedures, as required in the O&M Manual, for System and Equipment operation, Preventive Maintenance, and Corrective Maintenance to component level.
3. Enable BART personnel to operate the System and Equipment, including interfaces to other equipment.
4. Provide hands-on, step-by-step instruction in the disassembly and assembly of mechanical, electrical, electromechanical, and electronic modules and submodules to component level.
5. Train BART personnel to utilize System and Equipment documentation to perform Preventive and Corrective Maintenance to component level.
6. Provide hands-on training in Preventive Maintenance, including procedures for cleaning, lubricating, and adjusting, and for evaluating the wear of modules and submodules to component level.
7. Enable BART maintenance personnel to diagnose, isolate, and repair faults to component level, using commercially available or special test equipment supplied under the Contract.

8. Enable BART maintenance personnel to operate and maintain (diagnose, isolate, and repair faults to component level), any special test equipment, Maintenance Test Bench, and fixtures supplied under the Contract.

#### **1.09 DESCRIPTION OF TRAINING PROGRAM DELIVERABLES**

A. Training Program Plan: The Training Program Plan shall include the following elements:

1. A Flow Diagram, indicating the logical progression of Training Courses, including Course Title, Target Population, and Course Duration.
  - a. Because of the nature of their responsibilities, some personnel will receive training in more than one Course.
  - b. The Flow Diagram illustrates the logical sequence in which the training should be experienced for maximum effectiveness. Refer to Figure 2, Sample Training Program Flow Diagram.
2. Resumes showing the qualifications of all Instructors.
3. List of Subcontractors or equipment manufacturers who will participate in the Training Program
  - a. List of Subcontractors shall include a description of their role in training.
4. A list of Prerequisites for each Course
  - a. Enrollment in one Course in the Training Program may require prior completion of another Course in the Program. For example, enrollment in the System Management Training Course may require prior completion of the Equipment Operation Training Course.
  - b. Assume that the personnel to be trained have only the basic skills pertinent to their craft, as outlined in the District's job descriptions. District's job descriptions are available upon request.
  - c. Assume that the District personnel to be trained have no knowledge of features of the System or Equipment to be taught.

B. Instructor Guides and Attachments: Prepare Instructor Guides and Attachments.

1. Instructor Guides:
  - a. Instructor Guides shall detail the activities of the instructor during presentation of the Training Course.
  - b. The Instructor Guide shall be a written record of all the facts and details taught in the Training Course.
  - c. There shall be one Instructor Guide for each Training Course.
  - d. Instructor Guides shall be consistent in quality, context, and organization.

2. Each Instructor Guide shall be arranged as follows: (Refer to Exhibit A, Instructor Guide Format.)
  - a. Title:
    - 1) The Title shall be short and descriptive.
    - 2) The Title shall contain the name of the Training Course and, if applicable, the target population, for example, AFC Equipment Operation For Station Agents.
  - b. Time to Teach:
    - 1) An estimate of the Time to Teach all of the lessons in a Training Course
  - c. Objectives:
    - 1) Each Instructor Guide shall have one or more performance-based Objectives, such as those defined in the book entitled Preparing Instructional Objectives, by Robert Mager, published by the Center for Effective Performance.
    - 2) Each Course Objective shall be a precisely worded statement of the end-of-course performance expected of the students.
    - 3) Each Course Objective shall include:
      - a) The knowledge, skills, and abilities that the students will acquire
      - b) The methods of evaluating achievement of the objective, such as, written exam, skills test, or oral quiz
      - c) The conditions under which the evaluation will occur
      - d) The measurable level of performance required
  - d. Reference Documents List:
    - 1) Operation and Maintenance Manual shall be the primary reference document for the Instructor Guide.
    - 2) Sources of the material presented in the Instructor Guide shall be listed.
    - 3) Reference Documents may include Test Equipment Manuals, Original Equipment Manufacturer Manuals, Software Manuals, and documents developed by the Contractor.
  - e. Materials and Equipment: Material and Equipment used in the presentation of the Training Course shall be listed in the Instructor Guide. List shall include Student Training Manuals. List may include the following other Materials and Equipment:

- 1) Training Aids, such as Overhead Projector, dry erase board, markers, erasers, transparencies, charts, videotapes, VCR and monitor.
  - 2) Equipment, such as hand tools, notebook computers, test equipment, simulators, fixtures, and parts for disassembly.
  - 3) Special Facility Requirements, such as compressed air, network access, or unusual power requirements.
  - 4) All Materials and Equipment used in the presentation of training are deliverables, and shall become the property of the District, when Training Programs are developed under a Contract.
- f. Introduction: The Introduction shall include the following:
- 1) Name and background of Instructor.
  - 2) An overview of the subjects covered in the Training Course.
  - 3) The objectives of the Training Course.
  - 4) The outline of the Training Course.
  - 5) The schedule of Course activities, breaks, and class hours.
  - 6) Safety precautions related to the training environment.
  - 7) Classroom rules and procedures.
  - 8) Facility information, such as location of restrooms, lunchrooms, parking, and emergency evacuation routes.
- g. Presentation: The Presentation shall consist of a Lesson Plan for each Lesson in the Course, and shall have sufficient detail to:
- 1) Serve as a written record of the specific facts and information in the Training Course.
  - 2) Allow another Instructor with knowledge and experience in the subject to teach the Training Course.
  - 3) Ensure that the information presented during the training is consistent each time the Course is taught.
  - 4) Ensure achievement of all the objectives of the Training Course.
- h. Summary: This is a comprehensive review of the Lesson Objectives, summarizing key elements of the training for the entire Course.
- i. Test or Performance Evaluation:



- 1) The final examination to determine whether all the Lesson Objectives for the Course have been achieved. All questions or exercises shall be based on the Lesson Objectives in the Instructor Guide.
- j. Course Evaluation:
  - 1) Form to be filled out by students to provide a written review evaluating the Course and its presentation.
  - 2) Completed Course Evaluation Forms shall be submitted with the Training Report.
3. Attachments (to the Instructor Guide): Attachments include those Training Materials that are required for presentation of the Course. The following Attachments shall be supplied with each Instructor Guide:
  - a. Transparencies, slides, pictures, video tapes, tables, charts, diagrams, and any self-paced instruction, computer-based training, and multimedia materials.
  - b. Written procedures, as specified in the O&M Manual, for operating, maintaining, diagnosing, troubleshooting, and repairing the hardware, software, and firmware.
  - c. Any Command Code, Service Code, and Error Code List.
  - d. Tests, quizzes, and performance evaluations.
  - e. Schedule of Course activities.
- C. Student Training Manual: This document shall serve as a written record of the information presented in the Course; as a source document for use in the field; and as a guide that allows students to follow the lessons and organize class notes.
  1. Quantity (as specified in Contract Specifications Section 01 79 00, Demonstration and Training): There shall be one Student Training Manual for each student attending the Course.
  2. Training Manuals shall be separate from, and in addition to, the Operation and Maintenance Manuals.
  3. Student Training Manual shall consist of the following:
    - a. Schedule of Course activities including the following items:
      - 1) Lesson Titles.
      - 2) The part of the Training Day in which each Lesson will be covered.
      - 3) Type of Instruction employed in delivering each Lesson, such as Classroom, Hands-on, or Field.
    - b. Course Outline, including Titles and page numbers of each Lesson.

- c. Lesson Contents, including Lesson Titles and Objectives.
  - d. Copies of transparencies, slides, pictures, tables, charts, and diagrams used in support of the presentation.
  - e. Written procedures, specific to BART, for operating, maintaining, diagnosing, troubleshooting, and repairing the hardware, software, and firmware.
  - f. Any Command Code, Service Code, and Error Code List.
  - g. Course Evaluation Form.
- D. Training Demonstration: Present a Demonstration of each Training Course for the approval of the Engineer demonstrating compliance with the District's training specifications.
- 1. The Instructor Guides, Student Training Manuals, and Training Materials developed for the Staged Training shall be used in the Training Demonstrations.
  - 2. Present the Demonstrations to an Evaluation Team composed of BART personnel from the group to be trained, including Employee Development Specialists, Supervisors, and Foreworkers.
  - 3. The Evaluation Team will participate fully, as students, evaluating the course content, organization, and presentation for applicability and compliance with the District's training specifications.
  - 4. The Evaluation Team will prepare, for the Engineer, a list of non-conformances, and recommend either acceptance, acceptance with changes, or rejection of the Training Demonstration.
  - 5. The Evaluation Team may recommend to the Engineer that all (when rejected), or a portion (when accepted with changes) of the Training Demonstration be repeated.
  - 6. Each Training Demonstration, when approved by the Engineer, shall be counted as one of the "Classes Delivered by Supplier".
- E. Staged Training: The Staged Training is the formal presentation of the Training Course to BART personnel.
- 1. Staged Training shall be conducted at a BART facility. The Training may be conducted at a Contractor-provided facility, if accepted by the Engineer.
  - 2. Staged Training shall use Training Materials, Training Aids, and Training Devices provided under this Section.
  - 3. Classes shall not exceed 8 hours per day, including lunch and breaks.
  - 4. When required by the Engineer, provide training for BART personnel on second and third shift.
  - 5. Use actual production hardware whenever possible.

6. Provide sufficient Special Tools, fixtures, Training Aids, and Materials for the number of students in the Class. A Class is a group of students attending the same Course at the same time and place.
7. Products that are intended for revenue service and used for training shall pass re-inspection and acceptance testing prior to being placed in service.

#### **1.10 TRAINING AIDS, TRAINING MATERIALS, AND TRAINING DEVICES**

- A. Provide all Training Aids, Training Materials, Training Devices, Special Tools, fixtures, models, mockups, simulators, and other equipment required to train Course participants in quantities sufficient for the number of Course participants.
- B. Training Aids, Training Materials, and Training Devices shall be of durable construction, and shall become the property of the District on completion of Contractor-delivered Staged Training. If Contractor is not required to present Staged Training, submit Training Aids, Training Materials and Training Devices with the scheduled Final Training Program Deliverables.
- C. Models, mockups and Training Devices used in the Course shall be connected and configured to faithfully simulate the BART environment.

#### **1.11 TRAINING REPORTS**

- A. On completion of a Training Course, prepare a Training Report including a list of students, their final grades, and Evaluation Forms completed by the students of the Training Course.
- B. Grading System:
  1. Establish a grading system to identify students for whom further training is required. Obtain the Engineer's approval of proposed grading system.
  2. Keep grades strictly confidential and submit only to the BART Training Department.

#### **1.12 CLASS SIZE AND COURSE FREQUENCY**

- A. Class size and course frequency will be specified in Contract Specifications Section 01 79 00, Demonstration and Training.

#### **1.13 REPRODUCTION AND VIDEO AND AUDIO RECORDINGS**

- A. The District reserves the right to reproduce all Training Aids, Training Materials, Training Courses, and Training Devices for use in the Training Courses which are conducted by the District.
- B. The District shall have the right to make audio or video recordings of the presentation of all Training Courses.

**1.14 SUPPLEMENTAL TRAINING AND REVISIONS**

- A. Supplemental Training: Extend or supplement Training Courses if the form, fit, or function of the System, Equipment, or software is modified or reconfigured after completion of the Staged Training, including modifications to meet the District's Training Specifications.
- B. Revisions:
  - 1. Revisions shall be made to the Training Program Deliverables, Training Aids, and Training Devices to incorporate design changes, retrofits, changes generated during testing, and to correct errors and omissions throughout the Contract, Guaranty, and, if applicable, Warranty periods.
  - 2. Revisions shall be issued as soon as possible after changes are made or errors are found.
  - 3. Revisions to the Training Program Deliverables, Training Aids, and Training Devices shall be incorporated no less than quarterly for the duration of the Contract, Guaranty, and, if applicable, Warranty periods.
  - 4. Whenever a revision to a Training Program Deliverable is made which was submitted in electronic media, updated electronic version shall also be submitted.

**PART 2 - PRODUCTS**

Not used

**PART 3 - EXECUTION**

Not used

**END OF SECTION 01 79 00**

**EXHIBIT A**  
**INSTRUCTOR GUIDE FORMAT**

- I. Title of the Course
- II. Time to Teach the Course
- III. Objectives of the Course (Overall Course Objectives)
- IV. Reference Documents for the Course
- V. Material and Equipment for the Course
- VI. Introduction to the Course
- VII. Presentation (This consists of a Lesson Plan for each Lesson in the Course)
  - A. Lesson 1 (Lesson Plan)
    - 1. Title of the first Lesson
    - 2. Time to teach the first Lesson
    - 3. Objectives of the first Lesson
    - 4. Reference Documents for the first Lesson
    - 5. Material and Equipment for the first Lesson
    - 6. Introduction to the first Lesson
    - 7. Content of the first Lesson
    - 8. Summary of the first Lesson
    - 9. Test for the first Lesson
    - 10. Review of the Test for the first Lesson
  - B. Lesson *n*
    - 1. Title of the *nth* Lesson
    - 2. Time to Teach the *nth* Lesson
    - 3. Objectives of the *nth* Lesson
    - 4. Reference Documents for the *nth* Lesson
    - 5. Material and Equipment for the *nth* Lesson
    - 6. Introduction to the *nth* Lesson
    - 7. Content of the *nth* Lesson
    - 8. Summary of the *nth* Lesson
    - 9. Test for the *nth* Lesson
    - 10. Review of the Test for the *nth* Lesson
- VIII. Summary of the Course
- IX. Test or Performance Examination for the Course
- X. Course Evaluation by Students

**END OF OUTLINE**